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European Pine Shoot Moth Damage Reduced on Sheared Christmas Trees

Removing the buds from the new growth of red and Scotch pines after late June can prevent 86 to 100 percent of the bud clusters that develop later on treated shoots from becoming infested with the European pine shoot moth (Rhyacionia buoliana (Schiff.)). Prevailing operations to shape pine Christmas trees correspond to this type of treatment, and therefore this cultural practice also prevents serious damage by the shoot moth.

In Lower Michigan most shoot moth eggs are laid by the last of June. The newly hatched larvae migrate upward on the shoots, feed briefly at the base of new needles, then move to buds into which they bore for further feeding. This movement takes place within a week or two after hatching. Normally, by mid-July or early August most of the larvae have entered buds. Access to buds is necessary for survival.

Since the new growth of many pine Christmas trees is cut back for shaping purposes during late June and July, with new buds developing later in the summer and fall, it seemed logical to expect that this practice would also reduce shoot moth infestations. Studies were carried out on red, Austrian, and Scotch pines in Lower Michigan from 1956 to 1959 to evaluate the effect of bud removal on infestations of this insect. Test clippings were done during three periods: (1) late June, (2) mid-July, and (3) early August.

Fifty sample trees, 3 to 6 feet in height, in each of two plantations showing infestation by the European pine shoot moth were used for statistical evaluation. The buds on the new growth of alternate trees were clipped off and left lying on the ground in a manner to simulate shaping operations.

The following spring the top 50 shoots on the Scotch pine and 25 top shoots each on the red and Austrian pine that were treated were examined for infestation along with an equal number of tips on each untreated tree. All the buds on both treated and untreated trees were also examined for total tree infestation to assess the effects of the treatment on total insect populations. The results and their standard deviations for the late June treatment on red and Scotch pine were as follows:

Species	Height class, feet	Percentage of Sample Shoots Infested		Total No. of Insects	
		Clipped	Unclipped	Treated trees	Untreated trees
Scotch	6	3.6** ± 0.4	13.5 ± 1.2	4.3** ± 5.0	9.1 ± 8.6
Red	3	3.4** ± 0.3	15.2 ± 1.0	3.2** ± 2.9	7.1 ± 4.8

** Treatment significant statistically at 1-percent level.

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New shoots clipped in late June on the three pines studied developed a second bud cluster about 4 weeks later with a twofold increase in number of lateral buds. Late hatching larvae infested up to 14 percent of these bud clusters on Scotch and up to 8 percent on red pine. The average number was 3 to 4 percent. Less than 1 percent of the bud clusters developing after the mid-July treatment became infested, and none did after early August clipping.

After mid-July clipping, Scotch pine shoots developed buds in 4 to 8 weeks; a longer period was required for red and Austrian pines. These buds were slightly smaller, more numerous, and more scattered along the tip of the shoot than those following the first period. Often two buds formed in the terminal position. Buds forming on the shoots clipped in early August required 6 to 8 weeks and sometimes longer to develop on Scotch pine, and often did not develop until the following spring on red and Austrian pines. These buds were also small and scattered, and varied greatly in number.

These treatments produced no appreciable insect reduction on Austrian pine because of the low shoot moth populations that persisted each year on this species. Of the three pines studied, Austrian, a native of southern Europe, is the least susceptible and red pine the most susceptible.1/ Scotch pine is the species principally damaged in Europe.

The tips of shoots clipped off during late June, July, and early August and left on the ground contained no live larvae the following spring. The possibility of larvae moving back onto trees from these removed shoots is remote as shown by the less than 1-percent infestation of bud clusters obtained from treatments in July and early August when most of the larvae were on the tips that were removed.

The results of this study show that damage by the shoot moth can be greatly reduced when the new pine shoots are clipped after late June. An average of less than 3 to 4 percent of the bud clusters developing on these clipped shoots of pine was infested and destroyed by shoot moth. Although this type treatment also reduced the number of insects per tree by 50 percent, this reduction is not enough for adequate control of the insect.

These findings explain the reduction in shoot moth infestations commonly observed in pine plantings sheared regularly for Christmas trees. If shearing operations start when the pines are about 20 to 30 inches tall (usually about 3 years after planting) and are continued annually in late June and July until the growing season before harvest, damage to key portions of the tree can be prevented without expensive insecticidal treatment. Pine plantings having the heaviest shoot moth infestation should be treated last in the regular shaping operations to insure even more effective prevention from damage.

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1/ Miller, W. E., and H. J. Heikkenen. 1959. The relative susceptibility of eight pine species to European pine shoot moth attack in Michigan. Jour. Forestry 57(12): 912-914.